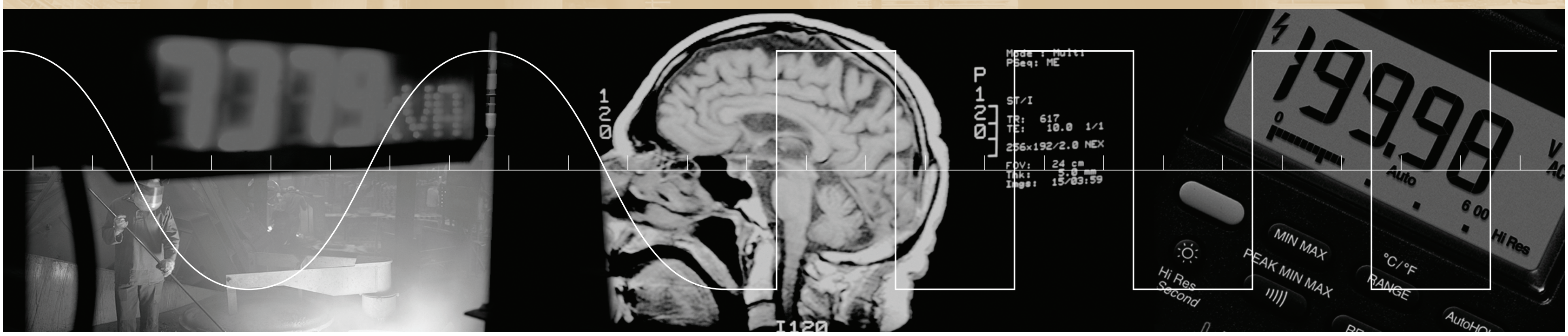


VOL 2

Industrial Signal Chain

High Performance Analog ICs



LINEAR TECHNOLOGY

Industrial systems demand semiconductors that are precise, flexible and reliable. Linear Technology offers a broad line of high performance analog ICs that simplify system design with rugged devices featuring parameters fully guaranteed over the -40°C to 85°C temperature range. We back this up with knowledgeable applications support, long product life cycles and superior on-time delivery.

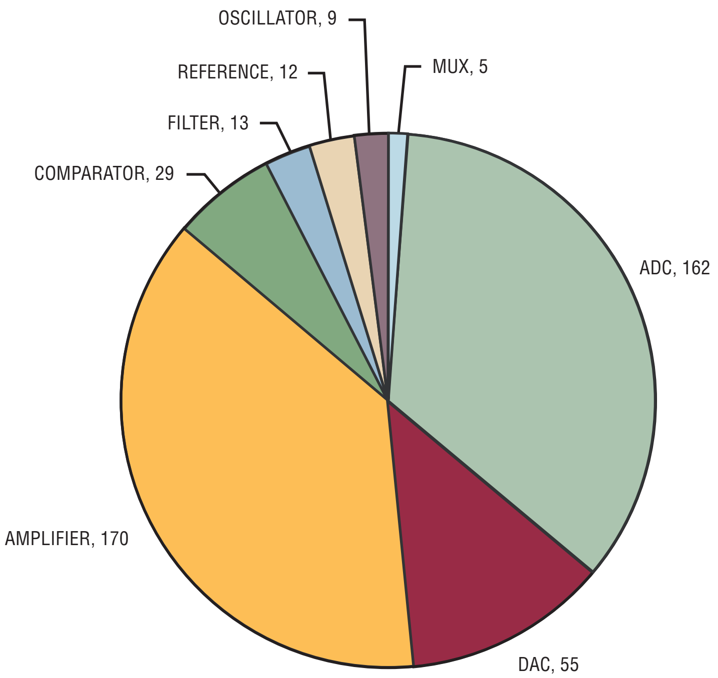
This brochure spotlights recently released signal path ICs from Linear Technology that are ideally suited for demanding industrial applications, including:

- ADCs
- DACs
- Amplifiers
- Comparators
- Filters
- Voltage References
- RMS-to-DC Converters
- Silicon Oscillators

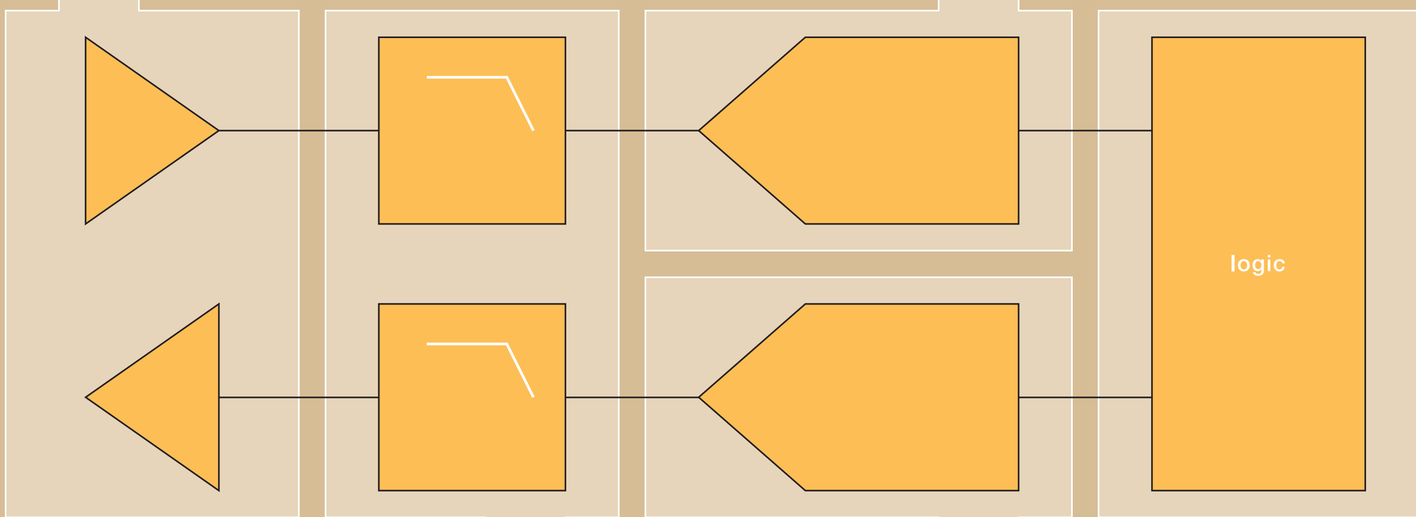
For the latest datasheets, application notes, software design tools and interactive selection tables, visit **www.linear.com**.

I/H Grade Parts by Product Type

Linear Technology offers over 450 analog and mixed-signal base parts specified from -40°C to 85°C or beyond for the most demanding industrial signal chain applications.



Industrial Signal Chain



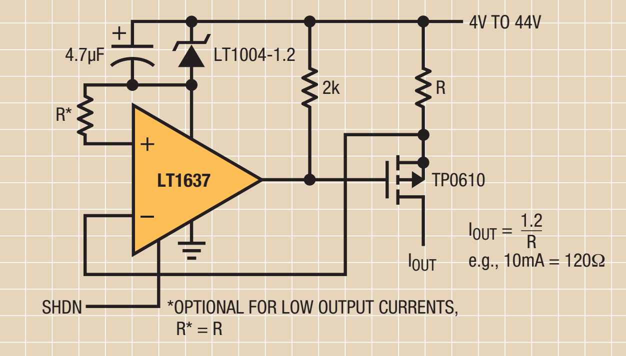
Precision Operational Amplifiers

Linear Technology's precision amplifiers combine DC accuracy with other critical features such as low noise, low power, small packages and rail-to-rail inputs and outputs, making them useful in a wide range of applications.

LT®1637

- Over-The-Top®: Operates with Inputs Above V +
- Rail-to-Rail Input and Output
- Micropower: 250µA Supply Current Max
- Gain-Bandwidth Product: 1.1MHz
- Slew Rate: 0.4V/µs
- Low Input Offset Voltage: 350µV Max
- Reverse Battery Protection to 25V
- High CMRR: 110dB
- Available in 8-Lead MSOP, PDIP and SO Packages; plus a Tiny (3mm × 3mm × 0.8mm) DFN Package

Switchable Precision Current Source



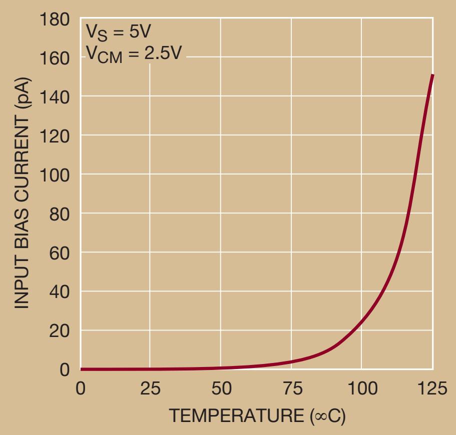
Precision Op Amps

Part No	Amplifiers per Package	V_{OS} Max 25°C (µV)	V_{OS} TC Max (µV/°C)	I_B Max 25°C (nA)	A_{VOL} (dB)	e_n (nV/√Hz) Typ	GBW (MHz)	Rail-to-Rail	I_S/Amp Max (mA)	V_{SUPPLY} (V)
LTC®2054/5	1/2	3	0.03	0.15	140	–	0.5	Out	0.15	2.7–7
LTC2050/1/2	1/2/4	3	0.03	0.075	140	–	3	Out	1.2	2.7–7
LTC2050/1/2HV	1/2/4	3	0.03	0.15	140	–	3	Out	1.5	2.7–12
LTC2054/5HV	1/2	5	0.03	0.15	140	–	0.5	Out	0.18	2.7–12
LTC1150/1	1/2	5	0.05	0.1	–	–	2.5	–	1.5	4.75–32
LT1007	1	25	0.6	35	146	2.5	8	–	4	4–44
LTC6078/9	2/4	25	0.7	0.001	130	18	0.75	In/Out	0.072	2.7–5.5
LT6010	1	35	0.8	0.11	126	14	0.33	Out	0.15	2.7–40
LT1028	1	40	0.8	90	150	0.85	75		9.5	8–44
LT1881/2	2/4	50	0.8	0.2	124	14	1	Out	0.9	2.4–40
LT1884/5	2/4	50	0.8	0.4	124	9.5	2	Out	0.9	2.4–40
LT1991	1	50	1	5	–	46	0.56	In/Out	0.11	2.4–40
LT6011/2	2/4	60	0.8	0.3	126	14	0.33	Out	0.15	2.4–40
LT1677	1	60	1.5	20	146	3.2	7.2	In/Out	3.5	2.5–44
LTC6081/2	2/4	70	0.8	0.001	120	13	3.6	In/Out	0.425	2.7–5.5
LT1468/9	1/2	75	2	40	139	5	90		5	6–36
LT1678/9	2/4	100	3	20	130	3.9	20	In/Out	3.5	2.7–36
LTC6244HV	2	100	2.5	0.075	128	8	50	Out	7.4	2.8–10.5
LTC6241/2	2/4	125	2.5	0.075	124	7	18	Out	2.2	2.8–6
LTC6241/2HV	2/4	175	2.5	0.075	124	7	18	Out	2.2	2.8–11
LT1013/4	2/4	150	2	20	138	22			0.5	4–44
LTC6240	1	175	2.5	0.001	124	7	18	Out	2.4	2.8–6
LTC6240HV	1	250	2.5	0.001	129	7	18	Out	3.3	2.8–11
LT1637	1	350	3	50	118	27	1	In/Out	0.25	1.8–44
LT1800/1/2	1/2/4	350	5	250	99	8.5	80	In/Out	2	2.3–12.6
LT1494/5/6	1/2/4	375	2	1	114	185	0.003	In/Out	0.0015	2.1–36
LT1490/1A	2/4	500	4	8	124	50	0.18	In/Out	0.055	2–44
LT6003/4/5	1/2/4	500	5	0.09	114	325	0.002	In/Out	0.001	1.6–16
LT6202/3/4	1/2/4	500	24	7000	106	1.9	100	In/Out	3.5	2.5–12.6
LT1638/9	2/4	600	6	50	124	20	1.2	In/Out	0.23	2.2–44
LT6000/1/2	1/2/4	750	5	5	96	75	0.05	In/Out	0.016	1.8–18
LTC6087/8	2/4	750	5	1 typ	136	12	14	In/Out	1.3	2.7–6
LTC6084/5	2/4	750	5	1 typ	126	27	1.5	In/Out	0.13	2.5–6

Low Bias Current Operational Amplifiers

CMOS operational amplifiers are known for their low bias current and low power operation. Linear Technology's family of CMOS op amps combine these advantages with high precision usually associated with bipolar amplifiers. The LTC6241 features peak-to-peak input referred noise of 550nV from 0.1Hz to 10Hz, allowing it to extract even the tiniest of signals from high impedance sensors. The LTC6078 delivers extraordinary DC precision at the lowest possible supply current, making it ideal for portable and loop-powered instrumentation applications.

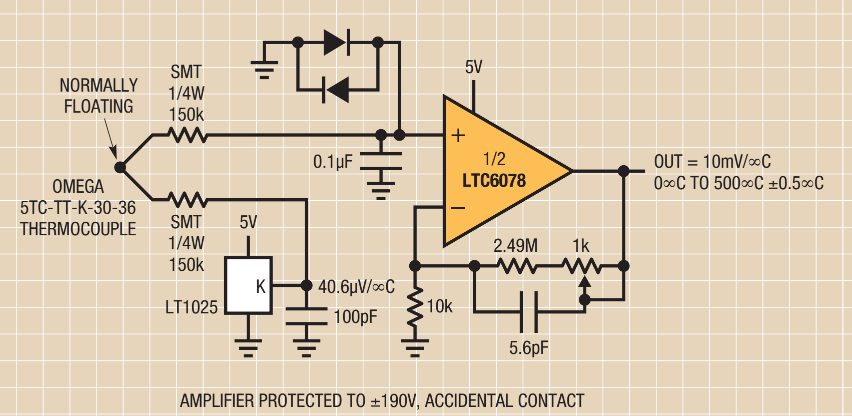
Input Bias vs Temperature



LTC6078

- Maximum Offset Voltage of 25µV (25°C)
- Maximum Offset Drift of 0.7µV/°C
- Maximum Input Bias:
  - 1pA (25°C)
  - 50pA (≤85°C)
- Micropower: 54µA per Amp
- 95dB CMRR (Min)
- 100dB PSRR (Min)
- Input Noise Voltage: 16nV/√Hz
- Rail-to-Rail Inputs and Outputs
- 2.7V to 5.5V Operation Voltage

Thermocouple Signal Conditioner



Low Bias Current Op Amps

Products	Amplifiers per Package	V_{OS} Max 25°C (µV)	TCV_{OS} Max (µV/°C)	I_B Max 25°C (pA)	e_n Typ (nV/√Hz)	GBW Typ (MHz)	SR Typ (V/µs)	I_S/Amp Max 25°C (mA)	V_{SUPPLY} (V)	Packages
LTC6078/9	2/4	25	0.7	1	18	0.75	0.05	0.072	2.7 to 6	MS-8, DFN/DFN, SSOP
LTC6081/2	2/4	70	0.8	1	13	3.6	1	0.425	2.7 to 5.5	MS-8, DFN/DFN, SSOP
LTC6240	1	175	2.5	1	7	18	10	2.4	2.8 to 6	SOT-23, SO-8
LTC6240HV	1	250	2.5	1	7	18	10	3.3	2.8 to 11	SOT-23, SO-8
LT1462/3	2/4	800	20	2	76	0.175	0.13	0.045	10 to 40	SO-8, DIP, SO-14
LT1057/8	2/4	450	10	50	13	5	14	2.5	8 to 40	SO-8, DIP, SO-16
LTC2050/1/2	1/2/4	3	0.03	75	–	3	2	1.2	2.7 to 12	SOT-23, DFN, MSOP, SO-8
LTC6244	2	100	2.5	75	8	50	35	7.4	2.8 to 6	MS-8, DFN
LTC6244HV	2	100	2.5	75	8	50	35	7.4	2.8 to 10.5	MS-8, DFN
LTC6241/2	2/4	125	2.5	75	7	18	10	2.2	2.8 to 6	DFN, SO-8/SSOP, DFN
LTC6241/2HV	2/4	175	2.5	75	7	18	10	2.2	2.8 to 11	DFN, SO-8/SSOP, DFN
LT6003/4/5	1/2/4	500	5	90	325	0.002	0.0008	1	1.6 to 16	SOT23-5, DFN/MS-8, TSSOP
LTC2054/5	2/4	3	0.03	150	–	0.5	0.5	150	2.7 to 6	SOT23-5, DFN-8, SO-8
LTC6084/5	2/4	750	5	1 typ	27	1.5	0.5	0.13	2.5 to 6	DFN-8, MS-8, DFN-16, SSOP-16
LTC6087/8	2/4	750	5	1 typ	12	14	7.2	1.3	2.7 to 5.5	MS-8, DFN/SSOP,DFN

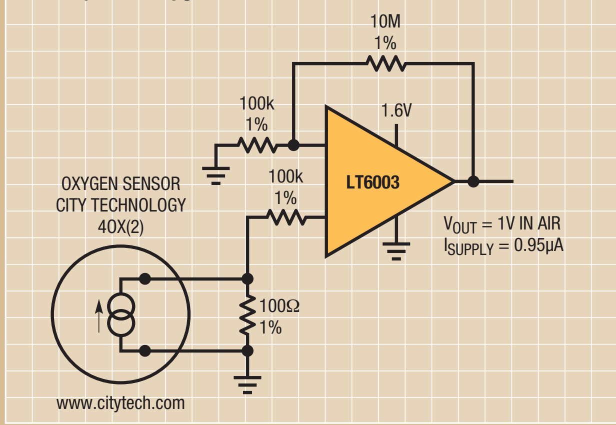
Low Power Operational Amplifiers

Linear Technology's family of low power precision operational amplifiers are designed to maximize battery life and performance through a combination of low operating current and wide supply range. These products also maintain excellent precision required for the most advanced handheld instruments.

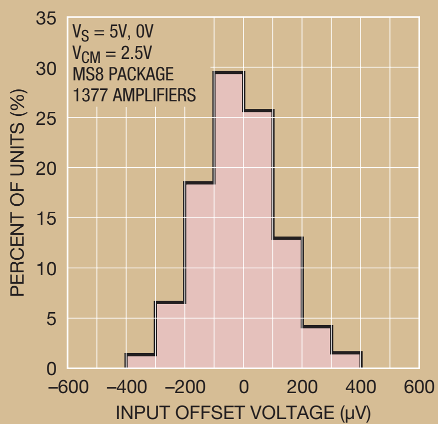
LT6003

- Wide Supply Range: 1.6V to 16V
- Low Supply Current: 1µA/Amplifier Max
- Low Input Bias Current: 90pA Max
- Low Input Offset Voltage: 500µV Max
- Low Input Offset Voltage Drift: 2µV/°C
- A_{VOL} Driving 20k Load: 100,000 Min
- Capacitive Load Handling: 500pF
- Specified from –40°C to 125°C
- Tiny 2mm x 2mm DFN or SOT-23 Package

Micropower Oxygen Sensor



V_{OS} Distribution



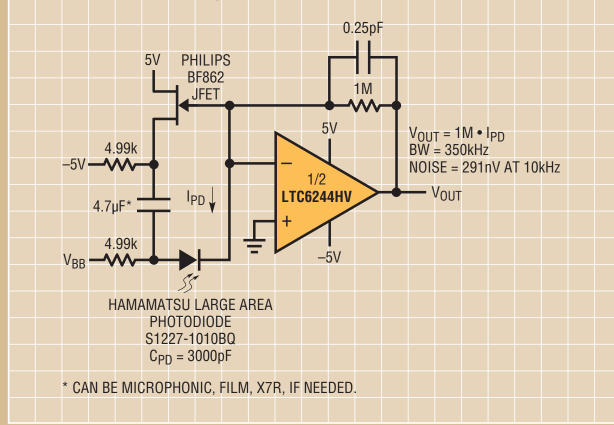
Low Power Op Amps

Part No	Amplifiers per Package	I_S/Amp (mA) Max	V_{OS} (mV)	I_B (nA)	e_n (nV/√Hz) Typ	GBW (MHz) Typ	V_{SUPPLY} (V)	Rail-to-Rail	Packages
LT6003/4/5	1/2/4	0.001	0.5	0.09	325	0.002	1.6 to 16	In/Out	SOT23-5, DFN-4, DFN-8, MS-8, DFN-16, TSSOP-16
LT1494/5/6	1/2/4	0.0015	0.375	1	185	0.0027	2.1 to 36	In/Out	DIP-8, MS-8, SO-8, DIP-14, SO-14
LT1672/3/4	1/2/4	0.002	0.375	1	185	0.012	2.1 to 36	In/Out	MS-8, SO-8, DIP-14, SO-14, SSOP-16
LT6000/1/2	1/2/4	0.016	0.6	5	75	0.05	1.8 to 18	In/Out	DFN, MSOP, SSOP-16
LT1178/9	2/4	0.017	0.07	5	49	0.085	2 to 44	–	SO-8, DIP, SO-16
LT2178/9	2/4	18	0.07	5	49	0.0175	2.2 to 44	–	SO-8, SO-14
LT1462/3	2/4	0.045	0.8	0.002	76	0.175	10 to 40	–	SO-8, SO-14, PDIP
LT2078/9	2/4	0.05	0.07	8	28	0.2	2.3 to 44	–	SO-8, SO-14
LT1078/9	2/4	0.05	0.07	8	28	0.2	2.2 to 44	–	SO-8, SO-16, PDIP
LTC2055HV	2	0.15	0.003	0.15	–	0.5	2.7 to 12	Out	DFN-8, MS-8
LTC2054HV	1	0.175	0.003	0.15	–	0.5	2.7 to 12	Out	SOT23-5
LT1635	1	0.2	1.3	4.5	50	0.175	1.1 to 14	Out	DIP-8, SO-8

Speed + Precision Operational Amplifiers

Linear Technology Speed + Precision Amplifiers offer an excellent combination of high gain bandwidth product and fast slew rate, low noise and high precision, making them an excellent choice in data acquisition and high speed sensor conditioning applications.

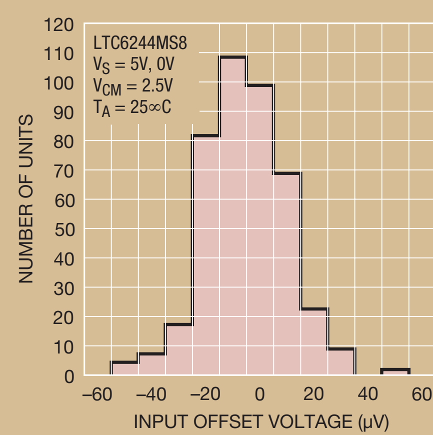
Very Low Noise Large Area Photodiode



LTC6244

- Input Bias Current: 1pA (Typ at 25°C)
- Low Offset Voltage: 100µV Max
- Low Offset Drift: 2.5µV/°C Max
- 0.1Hz to 10Hz Noise: 1.5µV_{P-P}
- Slew Rate: 40V/µs
- Gain Bandwidth Product: 50MHz
- Output Swings Rail-to-Rail
- Supply Operation:
  2.8V to 6V LTC6244
- Low Input Capacitance: 2.1pF

V_{OS} Distribution



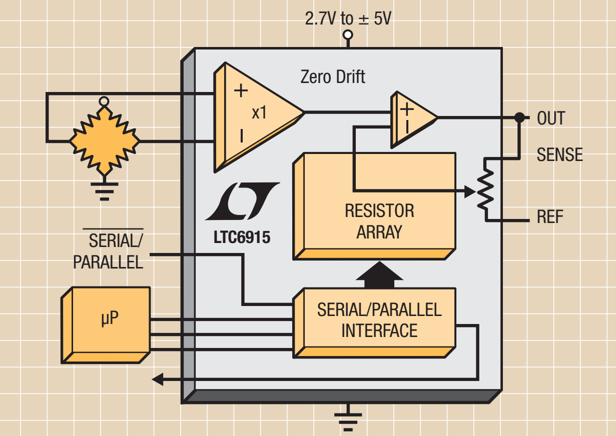
Speed + Precision Operational Amplifiers

Part No	Amplifiers per Package	GBW Typ (MHz)	SR Typ (V/µs)	V_{OS} Max (µV)	V_{OS} TC Max (µV/°C)	I_B Max (nA)	Rail-to-Rail	e_n (nV/√Hz) Typ	I_S/Amp Max (mA)	V_{SUPPLY} (V)	Packages
LT1806/7	1/2	325	125	550	5	4000	In/Out	3.5	13	2.5–12.6	SOT23-6, SO-8, MSOP-8
LT6230/1/2	1/2/4	215	70	500	3	10000	Out	1.1	3.75	3–12.6	SOT23-6, DFN-8, SO-8, SSOP-16
LT6202/3/4	1/2/4	100	25	500	24	7000	In/Out	1.9	3.5	2.5–12.6	SOT23-6, DFN-8, SO-8, MSOP-8, SO-14, SSOP-16
LT1468 /9	1/2	90	22	75	2	40	–	5	5	6–36	S0-8, PDIP
LT1800/1/2	1/2/4	80	25	350	5	250	In/Out	8.5	2	2.3–12.6	SOT23-5, DFN-8, SO-8, MSOP-8, SO-14
LT1028	1	75	15	40	0.8	90	–	0.85	9.5	8–44	SO-8, PDIP
LT1037	1	60	15	25	0.6	35	–	2.5	4.3	8–44	SO-8, PDIP
LT6220/1/2	1/2/4	60	20	350	5	150	In/Out	10	1	2.2–12.6	SOT23-5, DFN-8, SO-8, SSOP-16
LT6233/4/5	1/2/4	60	17	500	3	3000	Out	1.9	1.25	3–12.6	SOT23-6, DFN-8, SO-8, SSOP-16
LTC6244HV	2	50	35	100	2.5	0.075	Out	8	7.4	2.8–10.5	DFN-8, MSOP-8
LT1630/1	2/4	30	9.2	525	5.5	1000	In/Out	6	4.4	2.6–36	SO-8, PDIP, SO-14
1215/6	2/4	23	30	300	2.5	500	–	12	6.6	2.5–36	SO-8, PDIP, SO-14
LT1678/9	2/4	20	6	100	3	20	In/Out	3.9	3.4	3–36	SO-8, SO-14
LTC6241/2HV	2/4	18	10	125	2.5	0.075	Out	7	2.2	2.8–11	DFN-8, SO-16, DFN-16, SSOP-16
LTC6240HV	1	18	10	175	2.5	0.001	Out	7	2.4	2.8–11	SOT23-5, SO-8
LTC6087/8	2/4	14	7.2	750	5	0.001 typ	In/Out	12	1.3	2.7–5.5	DFN-10, MSOP-8, DFN-16, SSOP-16
LT1124/5	2/4	12.5	4.5	70	1	20	–	2.7	2.75	8–44	SO-8, PDIP, SO-16

Instrumentation Amplifiers

With very low DC offset along with high input impedance and high excellent common mode rejection, Linear Technology's in-amps are designed to cover all ranges of applications where extreme precision and stability of the circuit are required. Many of these, such as the LTC2053 implement a zero-drift architecture, improving total system precision and eliminating the need for post assembly trim. This family of parts includes different gain-setting methods, including a single gain setting resistor, two resistors (similar to an op amp) and digitally programmable gain. From fixed gain to programmable gain, Linear Technology offers a variety of instrumentation amplifiers, suited for all your circuit needs.

Zero Drift, Precision Instrumentation Amplifier with Digitally Programmable Gain



LTC6915

- 14 Levels of Programmable Gain
  0, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096
- Parallel or Serial (SPI) Interface for Gain Setting
- 125dB CMRR Independent of Gain
- Gain Accuracy: 0.075%
- Maximum Offset Voltage: 10μV
- Maximum Offset Drift: 50nV/°C
- Rail-to-Rail Input/Output
- 2.7V to ±5.5V Supply Range
- 3mm x 4mm DFN, SSOP-16 Packages

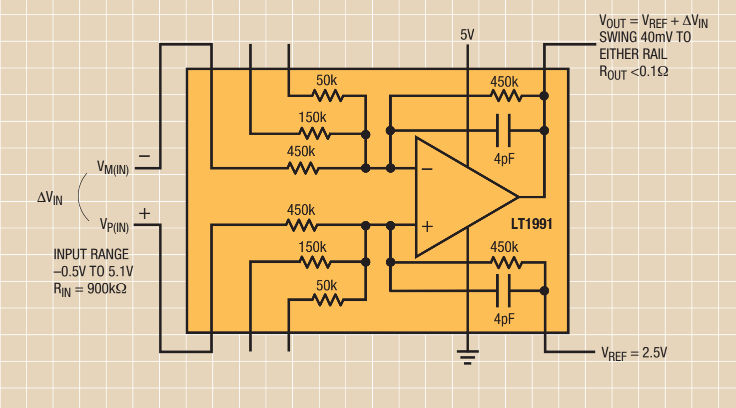
LTC6915 Demo Board

Device	Gain Range	V_{OS} Max 25°C (μV)	Supply Current Max 25°C (mA)	CMRR Min 25°C (dB)	GBW (MHz)	Supply Voltage (V)	Package	Gain Set	Comments
LTC1100	10 or 100	10	2.8	104	1.8	4.75–18	SOW-16, PDIP	Fixed Gain	Zero Drift
LT1101	10 or 100	160	0.13	100	0.37	1.8–44	SOW-16, PDIP	Fixed Gain	Micropower Single Supply
LT1167	1–10k	40	1.3	126	1	4.6–40	SO-8, PDIP	One R Set Gain	Precision, Low Ib
LT1168	1–10k	40	0.53	126	0.4	4.6–40	SO-8, PDIP	One R Set Gain	Low Ib, Low Power
LT1789-1	1–1k	100	0.095	100	0.06	2.2–36	SO-8	One R Set Gain	Precision, Micropower
LT1789-10	10–1k	160	0.095	98	0.025	2.2–36	SO-8	One R Set Gain	Precision, Micropower
LT1920	1–10k	125	1.3	110	0.8	4.6–40	SO-8, PDIP	One R Set Gain	Precision
LTC2053	Any	10	1.3	105	0.2	2.7–11	MSOP-8, DFN-8	Two Rs Set Gain	Zero Drift, RRIO
LTC2053-SYNC	Any	10	1.3	105	0.2	2.7–11	MSOP-8, DFN-8	Two Rs Set Gain	Zero Drift, Rail-to-Rail, Sync to External Clock
LTC6800	Any	100	1.2	90	0.2	2.7–5.5	MSOP-8, DFN-8	Two Rs Set Gain	Low Cost, Zero Drift, RRIO
LTC6915	1–4096	10	1.6	105	0.2	2.7–11	DFN-12, SSOP-16	Digital Gain	Zero Drift, Serial/Parallel Programmable

PGAs and Gain-Selectable Difference Amplifiers

With hundreds of different gain configurations available, Linear Technology's selectable gain amplifiers give designers precise gain just by strapping the pins. Free Configurator software shows the pin connections for your specific design. These amplifiers accurately amplify small differential voltages and reject large common mode signals. Linear Technology's single and dual programmable gain amplifiers allow designers to change the gain on-the-fly, providing even more circuit flexibility.

Rail-to-Rail Gain = 1 Difference Amplifier



LT1991

- Difference Amplifier Gain Range: 1 to 13
- Noninverting Amplifier Gain Range: 0.07 to 14
- Inverting Amplifier Gain Range: -0.08 to -13
- Gain Error: <0.04%
- Gain Drift: <3ppm/°C
- Wide Supply Range: Single 2.7V to Split ±18V
- Micropower: 100µA Supply Current
- Precision: 50µV Maximum Input Offset Voltage
- 560kHz Gain Bandwidth Product
- Rail-to-Rail Output

LT1990 Demo Board

PGAs and Diff Amps

Device	Channels	V_{SUPPLY} (V)	I_S/Amp (mA) Max	GBW (MHz)	Gain Range	Packages	Comments
LTC6910-1	S	2.7–10.5	3	11	0, 1, 2, 5, 10, 20, 50, 100	SO-8	Digitally Controlled Programmable Gain
LTC6910-2	S	2.7–10.5	3	13	0, 1, 2, 4, 8, 16, 32, 64	SO-8	Digitally Controlled Programmable Gain
LTC6910-3	S	2.7–10.5	3	11	0, 1, 2, 3, 4, 5, 6, 7	SO-8	Digitally Controlled Programmable Gain
LTC6911-1	D	2.7–10.5	3	11	0, 1, 2, 5, 10, 20, 50, 100	MS-10	Matched Amplifiers with Digitally Programmable Gain
LTC6911-2	D	2.7–10.5	3	11	0, 1, 2, 4, 8, 16, 32, 64	MS-10	Matched Amplifiers with Digitally Programmable Gain
LTC6912-1	D	2.7–10.5	2.75	30	0, 1, 2, 5, 10, 20, 50, 100	DFN-12, GN-16	Programmable Gain Amplifiers with Serial Digital Interface
LTC6912-2	D	2.7–10.5	2.75	30	0, 1, 2, 4, 8, 16, 32, 64	DFN-12, GN-16	Programmable Gain Amplifiers with Serial Digital Interface
LT1990	S	2.7–36	0.12	0.1	1 or 10	SO-8	±250V Input Range G = 1, 10, µpower, Difference Amplifier
LT1991	S	2.7–36	0.11	0.56	-13–14	MS-10, DFN-10	Precision, 100µA Gain Selectable Amplifier
LT1995	S	5–36	8.5	30	-7–8	MS-10, DFN-10	30MHz, 1000V/µs Gain Selectable Amplifier
LT1996	S	2.7–36	0.11	0.56	-117–118	MS-10, DFN-10	Precision, 100µA Gain Selectable Amplifier
LTC6915	S	2.7–11	1.6	0.2	0, 1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048, or 4096	DFN-12, GN-16	Zero Drift, Precision Instrumentation Amplifier with Digitally Programmable Gain

High Side Current Sense Amplifiers

Linear Technology offers the largest portfolio of high precision current sense amplifiers on the market. Higher precision means smaller value sense resistors, lower voltage drop and lower power/heat dissipation.

LTC6102/HV

- Supply Range:
  4V to 60V, 70V Abs Max (LTC6102)
  5V to 100V, 105V Abs Max (LTC6102HV)
- ±10µV Input Offset Max
- ±50nV/°C Input Offset Drift Max
- Fast Response: 1µs Step Response
- Gain Configurable with Two Resistors
- Low Input Bias Current: 3nA Max
- Operating Temperature Range: –40°C to 125°C
- PSRR: 130dB Min
- Available in 8-Lead MSOP and 3mm × 3mm DFN Packages

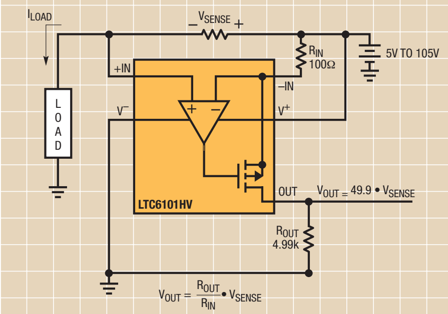


LTC6102 Demo Board

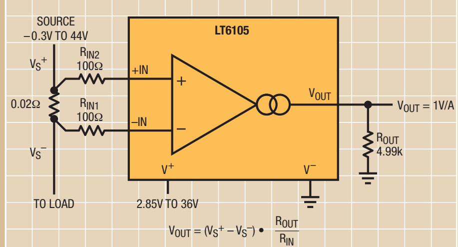
High Side Current Sense Amplifiers

Part No	V_{OS} Max 25°C (mV)	V_{OS} TC Max (µV/°C)	I_S Max 25°C (mA)	V_{SENSE} Max (mV)	Bi-directional	Packages	Comments
LTC6102HV	10	0.05	0.45	105	no	DFN-8, MS-8	Precision Zero Drift
LTC6102	10	0.05	0.45	70	no	DFN-8, MS-8	Precision Zero Drift
LT1787HV	75	0.5	0.12	60	yes	SO-8, MS-8	Precision, 60V V_{IN}
LT1787	75	0.5	0.12	36	yes	SO-8, MS-8	Precision, High-Side
LTC4151	4000		0.3	80	no	DFN-10, MS-10	Integrated 12-Bit I^2C ADC
LT6106	250	1 typ	0.095	44	no	SOT23-5	Low Cost 36V High-Side
LT6107	250	1 typ	0.095	44	no	SOT23-5	Wide Temperature range: -55C to 150C
LT6105	300	0.5 typ	0.3	44	no	DFN-6, MS-8	Wide Input Range -0.3V to 44V (Independent of V+)
LTC6101HV	300	1	0.45	105	no	SOT23-5, MS-8	High Voltage, High-Side
LTC6101	300	1	0.45	70	no	SOT23-5, MS-8	High Voltage, High-Side
LT6100	300	1.5 typ	0.13	48	no	DFN-8, MS-8	Precision, Gain Selectable
LTC6103	450	1.5	0.5	70	no	MS-8	Dual High Voltage, High-Side
LTC6104	450	1.5	0.52	70	yes	MS-8	High Voltage, High-Side, Bidirectional

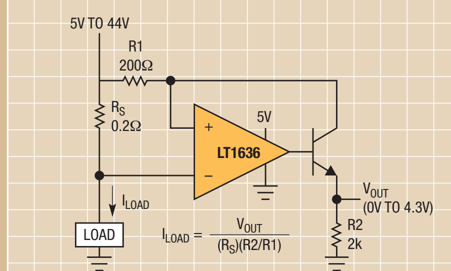
High Voltage Current Sensing with 16-Bit Resolution



Gain of 50 Current Sense Amplifier



Over-The-Top Current Sense



Selected Op Amps for Current Sense Applications

Part No	V_{OS} Max 25°C (µV)	V_{OS} Drift Max (µV/°C)	I_{SUPPLY} Max 25°C (mA)	SR Typ (V/µs)	Sense Voltage Max (V)	Packages	Comments
LTC2050/1/2	3	0.03	1.5	2	12	SOT-23, DFN-8, MSOP, SO-8, SSOP-16	Zero Drift Amplifiers
LT1991	50	1	0.11	0.12	60	DFN-10, MS-10	Precision, 100µA, Gain Selectable Difference Amplifier
LTC4150	100		0.14		9	MS-8	Coulomb Counter
LT1636	225	5	0.055	0.045	44	DFN-8, DIP-8, MS-8, SO-8	Over-The-Top Micropower Op Amp
LT1637/8/9	350	3	0.25	0.35	44	DFN-8, DIP-8, MS-8, SO-8, DIP-14, SO-14	Single/Dual/Quad, High Voltage Over-The-Top Input
LT1494/5/6	375	2	0.0015	.001	36V	DIP-8, MS-8, SO-8, DIP-14, SO-14	Single/Dual/Quad, Rail-to-Rail I/O Over-The-Top
LT1490/1A	500	4	0.055	0.06	44	DFN-8, DIP-8, MS-8, SO-8, DIP-14, SO-14	Dual/Quad, Rail-to-Rail I/O Over-The-Top
LT1990	5200	22	0.18	0.55	250	SO-8	Diff Amp, Built-In Resistors, ±250V Input
LT1995	5000	26	8.5	1000	15.5	MS-8	30Mhz Diff Amp, Built-In Resistors

* See additional applications in Linear Technology's Online Current Sense Circuit Collection: http://www.linear.com/currentsense

High Speed Differential ADC Drivers/Filters

As new data converters are developed with higher throughput and resolution, the demands on the circuits that drive these converters increase significantly. Several products from Linear Technology address this challenge. Linear Technology offers high speed ADC drivers with features such as integrated gain-setting resistors, integrated filters, low noise and distortion, rail-to-rail operation and matched dual channels.

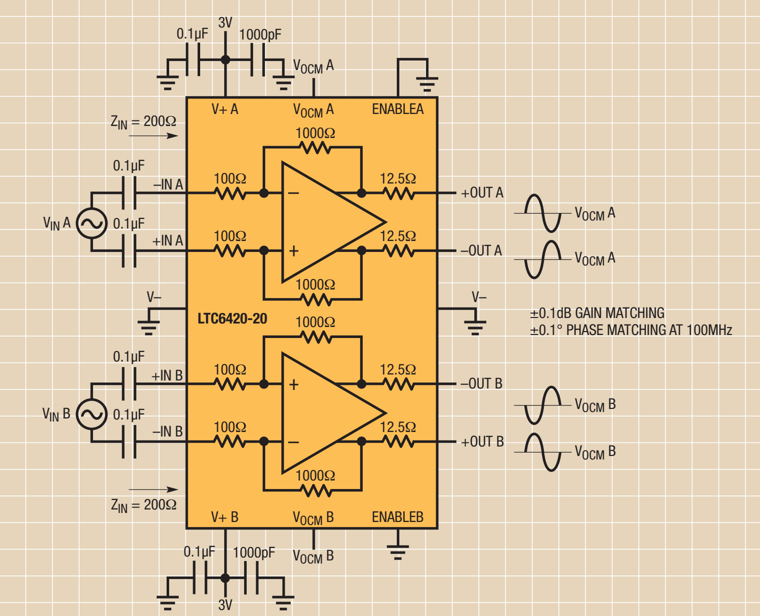


LTC6420 Demo Board

LTC6420-20

- Matched Gain ±0.1dB
- Matched Phase ±0.1° at 100MHz
- Channel Separation 80dB at 100MHz
- 1.8GHz –3dB Bandwidth; Fixed Gain of 10V/V (20dB)
- IMD3 = –84dBc at 100MHz, $2V_{P-P}$
- Equivalent OIP3 = 46dBm at 100MHz
- 1nV/√Hz Internal Op Amp Noise
- 6.2dB Noise Figure
- Differential Inputs and Outputs
- Rail-to-Rail Output Swing
- 80mA Supply Current (240mW) per Amplifier
- 1.1V to 1.6V Output Common Mode Voltage, Adjustable
- DC- or AC-Coupled Operation
- 20-Lead 3mm × 4mm × 0.75mm QFN Package

Matched Dual Amplifier with Output Common Mode Biasing



Differential ADC Drivers and Filters

Part No	Input Frequency Range	Gain	Distortion	Noise	Supply Voltage	Supply Current	Features
LT1994	DC-3MHz	R-Set	-94dBc @ 1MHz	3nV/√Hz	2.375V to 12.6V	14mA	Wide V_S Range
LTC6403	DC-15MHz	R-Set	-89dBc @ 5MHz	2.8nV/√Hz	2.7V to 5.5V	11mA	Low Power
LT6600	DC-20MHz	R-Set	-88dBc @ 1MHz	14nV/√Hz	3V to 11V	35mA	Integrated 4th Order Filter
LT6402	DC-30MHz	6, 12, 20dB	-84dBc @ 10MHz	1.85nV/√Hz	4V to 5.25V	30mA	Fixed Gain
LT6411	DC-30MHz	0, 6dB	-77dBc @ 30MHz	8nV/√Hz	4.5V to 12.5V	16mA	Selectable Gain
LTC6404	DC-30MHz	R-Set	-92dBc @ 10MHz	1.5nV/√Hz	2.7V to 5.5V	27mA	Low Noise
LTC6405	DC-60MHz	R-Set	-90dBc @ 20MHz	1.6nV/√Hz	2.7V to 5.25V	18mA	RR In
LTC6406	DC-60MHz	R-Set	-72dBc @ 50MHz	1.6nV/√Hz	2.7V to 3.5V	18mA	RR In
LT1993	DC-70MHz	6, 12, 20dB	-80dBc @ 50MHz	2.15nV/√Hz	4V to 5.25V	100mA	Fixed Gain
LTC6401	DC-140MHz	8, 14, 20, 26dB	-88dBc @ 70MHz	2.1nV/√Hz	2.85V to 3.5V	45mA	Fixed Gain
LTC6421	DC-140MHz	8, 14, 20, 26dB	-74dBc @ 100MHz	2.2nV/√Hz	2.85V to 3.5V	40mA	Matched Dual
LTC6400	DC-300MHz	8, 14, 20, 26dB	-81dBc @ 140MHz	2.1nV/√Hz	2.85V to 3.5V	85mA	Fixed Gain
LTC6420	DC-300MHz	8, 14, 20, 26dB	-80dBc @ 100MHz	2.2nV/√Hz	2.85V to 3.5V	80mA	Matched Dual
LTC6410-6	DC-300MHz	6dB	-62dBc @ 140MHz	11dB	2.8V to 5.25V	125mA	RF Gain Block

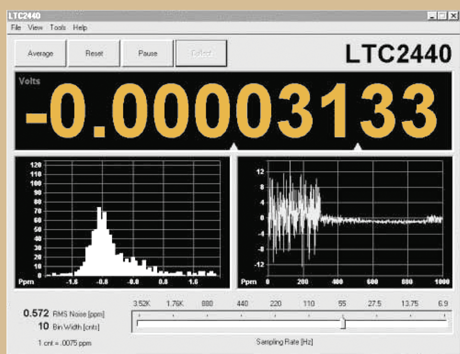
Data Conversion for Low Frequency Signals

Linear Technology's family of No Latency Delta-Sigma analog-to-digital converters (ADCs) is unrivaled in performance, ease of use and tiny package sizes. With ADC resolutions from 16 bits up to 24 bits, up to 16 input channels and either I^2C or SPI serial interfaces, we offer a data converter for nearly any precision measurement application. The entire delta-sigma ADC portfolio is supported with evaluation boards and a free Quick Eval software tool (www.linear.com/company/software.jsp), complete with the DC590B USB data acquisition board.

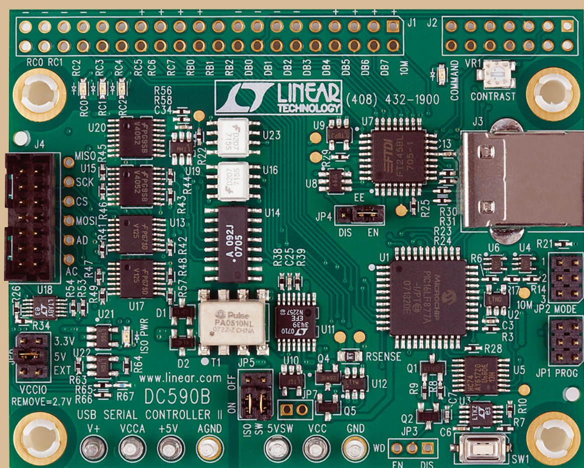
LTC2449

- Up to Eight Differential or 16 Single-Ended Input Channels
- Up to 8kHz Output Rate, 4kHz Multiplexing Rate
- Selectable Speed/Resolution with Variable Oversampling Ratio
  2µV_{RMS} Noise at 1.76kHz Output Rate
  200nV_{RMS} Noise at 13.8Hz Output Rate with Simultaneous
  50/60Hz Rejection
- No Latency Mode, Each Conversion is Accurate Even After a New Channel is Selected
- 0.0005% INL, No Missing Codes
- Internal Oscillator — No External Components
- Tiny 5mm x 7mm QFN Package
- Differential Input and Differential Reference with GND to V_{CC} Common Mode Range

LTC2449 Demo Board



Quick Eval User Interface



DC590B USB Serial Controller

No Latency Delta-Sigma ADCs (<8kHz Output Rate)

Part No	Bits	Input Channels	Sample Rate (sps)	RMS Noise	Offset Error	Full-Scale Error	Comments	Packages (mm × mm)
LTC2440	24	1 Differential	4000	200nV	2.5µV	10ppm		SSOP-16
LTC2442	24	2 Differential/ 4 Single-Ended	8000	220nV	2.5µV	10ppm	Internal Amplifiers	SSOP-36
LTC2444	24	4 Differential/ 8 Single-Ended	8000	280nV	2.5µV	10ppm		QFN-38 (5 x 7)
LTC2445	24	4 Differential/ 8 Single-Ended	8000	200nV	2.5µV	10ppm	MUX$_{OUT}$/ADC$_{IN}$ Pins Allow External Buffer in Front of ADC	QFN-38 (5 x 7)
LTC2446	24	4 Differential/ 8 Single-Ended	8000	280nV	2.5µV	10ppm	Multiple Reference Inputs	QFN-38 (5 x 7)
LTC2447	24	4 Differential/ 8 Single-Ended	8000	200nV	2.5µV	10ppm	Multiple Reference Inputs, MUX$_{OUT}$/ADC$_{IN}$ Pins Allow External Buffer in Front of ADC	QFN-38 (5 x 7)
LTC2448	24	8 Differential/ 16 Single-Ended	8000	280nV	2.5µV	10ppm		QFN-38 (5 x 7)
LTC2449	24	8 Differential/ 16 Single-Ended	8000	200nV	2.5µV	10ppm	MUX$_{OUT}$/ADC$_{IN}$ Pins Allow External Buffer in Front of ADC	QFN-38 (5 x 7)

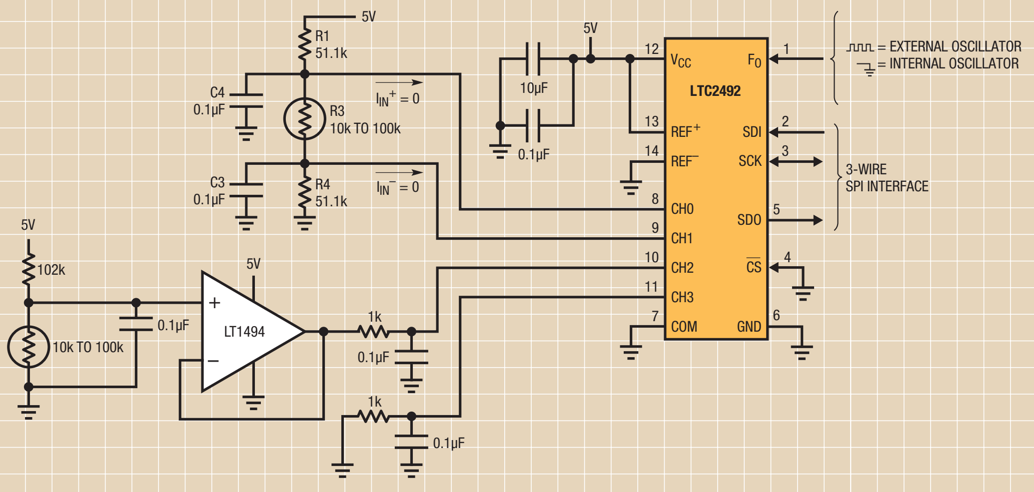
Easy Drive™ and Ultra-Tiny Delta-Sigma ADCs

Voted one of *Electronic Design's* ADCs of the Year in 2007, the LTC2450 family of ultra-tiny ADCs are ideal for measuring automotive signals such as temperature, pressure and viscosity. For higher precision applications, Linear offers a complete family of single channel, dual channel, and eight channel pin- and software-compatible 24-bit and 16-bit Easy Drive ADCs.

Ultra-Tiny Delta-Sigma ADCs

Part No	Bits	Input Channels (Differential/Single-Ended)	RMS Noise	I/O	Sample Rate	Total Unadjusted Error (Max)	PGA	Temp Sensor	Packages (mm x mm)
LTC2450	16	1	1.4µV	SPI	60Hz	0.05%			DFN-6 (2 x 2)
LTC2451	16	1	1.4µV	I²C	60Hz	0.05%			DFN-8 (3 x 2), TSOT23-8
LTC2452	16	1	1.4µV	SPI	60Hz	0.05%			DFN-8 (3 x 2), TSOT23-8
LTC2453	16	1	1.4µV	I²C	60Hz	0.05%			DFN-8 (3 x 2), TSOT23-8
LTC2480	16	1	0.6µV	SPI	15Hz	0.004%	•	•	DFN-10 (3 x 3)
LTC2481	16	1	0.6µV	I²C	15Hz	0.004%	•	•	DFN-10 (3 x 3)
LTC2482	16	1	0.6µV	SPI	7.5Hz	0.004%			DFN-10 (3 x 3)
LTC2483	16	1	0.6µV	I²C	7.5Hz	0.004%			DFN-10 (3 x 3)
LTC2484	24	1	0.6µV	SPI	15Hz	0.004%		•	DFN-10 (3 x 3)
LTC2485	24	1	0.6µV	I²C	15Hz	0.004%		•	DFN-10 (3 x 3)
LTC2486	16	2/4	0.6µV	SPI	15Hz	0.004%	•	•	DFN-14 (4 x 3)
LTC2487	16	2/4	0.6µV	I²C	15Hz	0.004%	•	•	DFN-14 (4 x 3)
LTC2488	16	2/4	0.6µV	SPI	7.5Hz	0.004%			DFN-14 (4 x 3)
LTC2489	16	2/4	0.6µV	I²C	7.5Hz	0.004%			DFN-14 (4 x 3)
LTC2492	24	2/4	0.6µV	SPI	15Hz	0.004%		•	DFN-14 (4 x 3)
LTC2493	24	2/4	0.6µV	I²C	15Hz	0.004%		•	DFN-14 (4 x 3)
LTC2494	16	8/16	0.6µV	SPI	15Hz	0.004%	•	•	DFN-38 (5 x 7)
LTC2495	16	8/16	0.6µV	I²C	15Hz	0.004%	•	•	DFN-38 (5 x 7)
LTC2496	16	8/16	0.6µV	SPI	7.5Hz	0.004%			DFN-38 (5 x 7)
LTC2497	16	8/16	0.6µV	I²C	7.5Hz	0.004%			DFN-38 (5 x 7)
LTC2498	24	8/16	0.6µV	SPI	15Hz	0.004%		•	DFN-38 (5 x 7)
LTC2499	24	8/16	0.6µV	I²C	15Hz	0.004%		•	DFN-38 (5 x 7)

LTC2492 Allows Easy Measurement of Multiple Thermistors or High Impedance Sensors





Ultra-Tiny ADC Demo Board

General Purpose SAR ADCs

Linear offers a wide range of general purpose ADCs from 8 bits, 12 bits, up to 16 bits. These SAR ADCs feature excellent AC and DC performance with low power. From single input channel to multiplexed/simultaneous sampling applications, Linear has the right general purpose/SAR ADC for you.

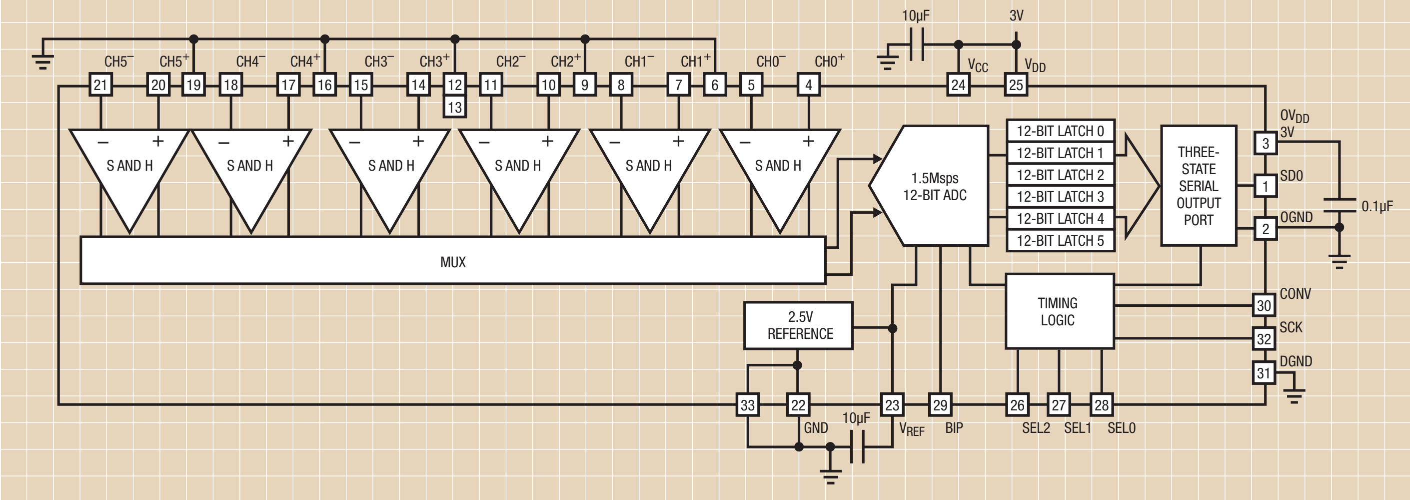
LTC2351

- 1.5Msps ADC with Six Simultaneously Sampled Differential Inputs
- 250ksps Throughput per Channel
- 75dB SINAD
- 3V Single Supply Operation (16.5mW @ 1.5Msps)
- 2.5V Internal Reference, Can be Overdriven with External Reference
- 3-Wire SPI-Compatible Serial Interface
- 0V to 2.5V Unipolar, or ±1.25V Bipolar Differential Input Range
- Small 32-Pin (5mm × 5mm) QFN Package

Simultaneous Sampling ADCs

Part No	Bits	Input Channels	Input Range	Sample Rate	Packages (mm x mm)
LTC2351-14	14	6 Differential	0V–2.5V or ±1.25V	1.5Msps	QFN-32 (5 x 5)
LTC1408	14	6 Differential	0V–2.5V or ±1.25V	600ksps	QFN-32 (5 x 5)
LTC1407A	14	2 Differential	0V–2.5V	3Msps	MSOP-10
LTC1407A-1	14	2 Differential	±1.25V	3Msps	MSOP-10
LTC2351-12	12	6 Differential	0V–2.5V or ±1.25V	1.5Msps	QFN-32 (5 x 5)
LTC1408-12	12	6 Differential	0V–2.5V or ±1.25V	600ksps	QFN-32 (5 x 5)
LTC1407	12	2 Differential	0V–2.5V	3Msps	MSOP-10
LTC1407-1	12	2 Differential	±1.25V	3Msps	MSOP-10

LTC2351-14 Block Diagram

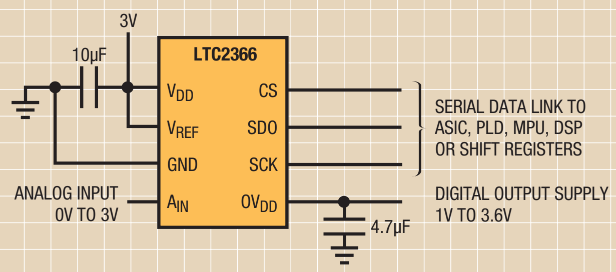


Fast, Tiny Single Channel ADCs

LTC2366

- 12-Bit Resolution
- Pin- and Software-Compatible 3Msps/1Msps/500ksps/250ksps/100ksps Family
- Low Noise: 73dB SNR
- Low Power Dissipation: 6mW @ 1Msps
- Single Supply 2.35V to 3.6V Operation
- No Data Latency
- Sleep Mode with 0.1µA Typical Supply Current
- Dedicated External Reference and OV_{DD} Digital Output Supply
- SPI/MICROWIRE-Compatible Serial I/O
- Guaranteed Operation from –40°C to 125°C
- Tiny 6- and 8-Lead TSOT-23 Plastic Packages

LTC2366: 3Msps 12-Bit ADC



Fast, Tiny Single Channel ADCs

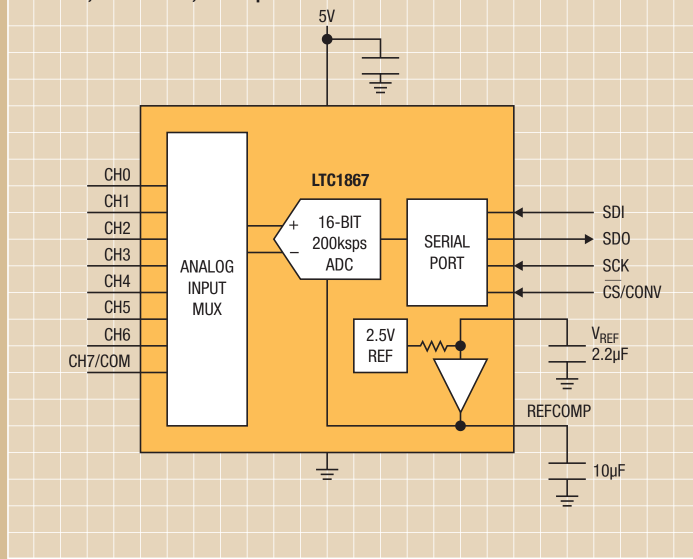
Part No	Bits	Sample Rate	V_{CC}	Input Range	I/O	Power @ Max Sample Rate	Maximum Ambient Temperature	Packages
LTC2355-14	14	3.5Msps	3.1V–3.6V	0V–2.5V	Serial	18mW	85°C	MSOP-10
LTC2356-14	14	3.5Msps	3.1V–3.6V	±1.25V	Serial	18mW	85°C	MSOP-10
LTC1403A	14	2.8Msps	2.7V–3.6V	0V–2.5V	Serial	12mW	125°C	MSOP-10
LTC1403A-1	14	2.8Msps	2.7V–3.6V	±1.25V	Serial	12mW	85°C	MSOP-10
LTC1414	14	2.2Msps	±5V	±2.5V	Parallel	175mW	85°C	SSOP-28
LTC2355-12	12	3.5Msps	3.1V–3.6V	0V–2.5V	Serial	18mW	85°C	MSOP-10
LTC2356-12	12	3.5Msps	3.1V–3.6V	±1.25V	Serial	18mW	85°C	MSOP-10
LTC2366	12	3Msps	2.35V–3.6V	0V–3.6V	Serial	7.8mW	125°C	TSOT23-6/8
LTC1412	12	3Msps	±5V	±2.5V	Parallel	150mW	85°C	SSOP-28
LTC1403	12	2.8Msps	2.7V–3.6V	0V–2.5V	Serial	12mW	125°C	MSOP-10
LTC1403-1	12	2.8Msps	2.7V–3.6V	±1.25V	Serial	12mW	85°C	MSOP-10
LTC2365	12	1Msps	2.35V–3.6V	0V–3.6V	Serial	6mW	125°C	TSOT23-6/8
LTC2362	12	500ksps	2.35V–3.6V	0V–3.6V	Serial	3.3mW	125°C	TSOT23-6/8
LTC2361	12	250ksps	2.35V–3.6V	0V–3.6V	Serial	2.2mW	125°C	TSOT23-6/8
LTC2360	12	100ksps	2.35V–3.6V	0V–3.6V	Serial	1.5mW	125°C	TSOT23-6/8

General Purpose ADCs

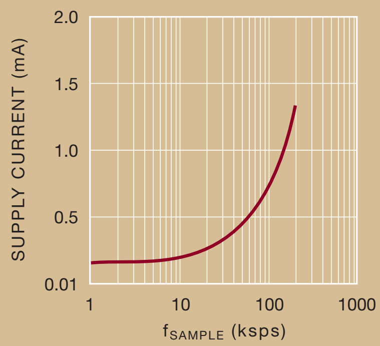
LTC1867

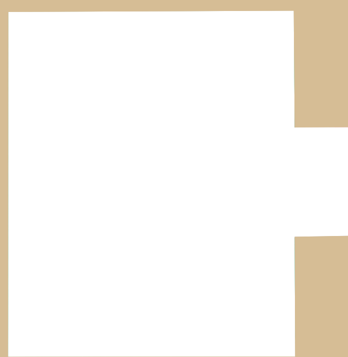
- 8 Single-Ended Inputs, 4 Differential Inputs, or Combinations of Both
- 16-Bit No Missing Codes and ±2LSB INL (Max)
- Sample Rate: 200ksps
- Unipolar or Bipolar Conversion Modes
- Internal or External Reference
- Low Power: 1.3mA at 200ksps, 0.76mA at 100ksps

16-Bit, 8-Channel, 200ksps ADC



Supply Current vs Sampling Frequency





LTC1867 Demo Board

Low Power Serial ADCs

Part No	Bits	Input Channels	Sample Rate (ksps)	Input Span	V_{CC}	Power (mW)	I/O	Packages (mm x mm)
LTC1867(L)	16	8 Single-Ended/ 4 Differential	200 (175)	0V–4.096V or ±2.048 (0V –2.5V or ±1.25V)	5V (3V)	6.5 (2.25)	SPI	SSOP-16
LTC1865 (L)	16	2 Single-Ended	250 (150)	0V–5V (0V to 3V)	5V (3V)	4.25 (2.25)	SPI	SO-8, MSOP-10
LTC1864 (L)	16	1 Differential	250 (150)	0V–5V (0V to 3V)	5V (3V)	4.25 (1.22)	SPI	SO-8, MSOP-8
LTC2308	12	8 Single-Ended/ 4 Differential	500	0V–4.096V or ±2.048	5V	17.5	SPI	QFN-24 (4 x 4)
LTC1863 (L)	12	8 Single-Ended/ 4 Differential	200 (175)	0V–4.096V or ±2.048 (0V –2.5V or ±1.25V)	5V (3V)	6.5 (2.25)	SPI	SSOP-16
LTC2309	12	8 Single-Ended/ 4 Differential	14	0V–4.096V or ±2.048	5V	11.5	I^2C	QFN-24 (4 x 4)
LTC2306	12	2 Single-Ended	500	0V–5V	5V	14	SPI	DFN-10 (3 x 3)
LTC1861 (L)	12	2 Single-Ended	250 (150)	0V–5V (0V to 3V)	5V (3V)	4.25 (2.25)	SPI	SO-8, MSOP-10
LTC2302	12	1 Differential	500	0V–5V	5V	14	SPI	DFN-10 (3 x 3)
LTC1860 (L)	12	1 Differential	250 (150)	0V–5V (0V–3V)	5V (3V)	4.25 (1.22)	SPI	SO-8, MSOP-8

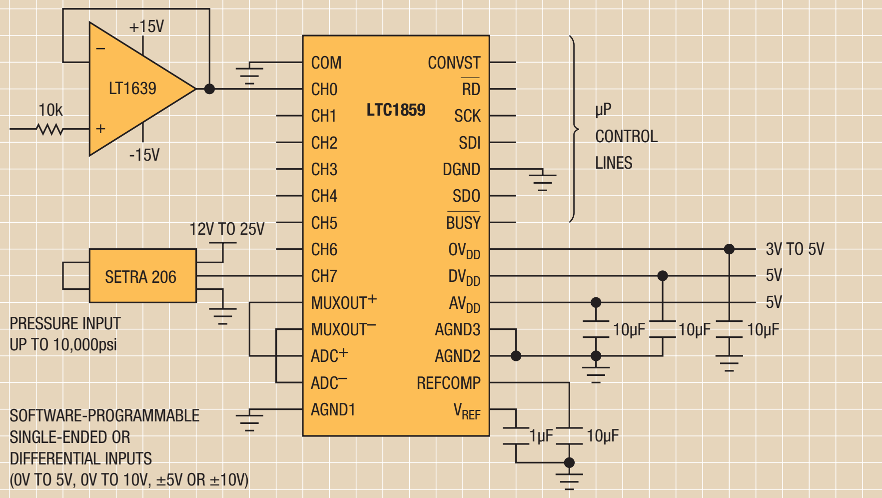
(L) Signifies V_{CC} = 3V

SoftSpan™ ADCs for Wide Input Range Applications

LTC1859

- Sample Rate: 100ksps
- 8-Channel Multiplexer with ±25V Protection
- Single 5V Supply
- Software-Programmable Input Ranges:
  0V to 5V, 0V to 10V, ±5V or ±10V
  (LTC1859/LTC1858/LTC1857)
- Fixed ±10V Input Range
  (LTC1856/LTC1855/LTC1854)
- 8 Single-Ended or 4 Differential Inputs
- 28-Pin SSOP Package

16-Bit, 8-Channel ADC with Software Programmable Input Ranges



±10V ADCs (Software-Programmable or Resistor-Selectable)

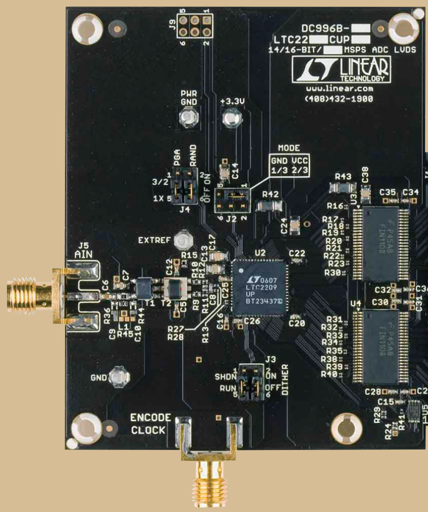
Part No	Bits	Input Channels	Sample Rate (ksps)	Input Span	V_{CC}	Power (mW)	Max DNL (LSB)	Max INL (LSB)	I/O	Packages
LTC1859	16	8	100	Software-Programmable 0V–5V, 0V–10V, ±5V, or ±10V	5V	40	2	3	Serial	SSOP-28
LTC1856	16	8	100	±10V	5V	40	2	3	Serial	SSOP-28
LTC1605	16	1	100	±10V, ±4V, 0V–4V	5V	55	1	2	Parallel	PDIP-28, SSOP-28, SW-28
LTC1606	16	1	250	±10V	5V	75	1	2	Parallel	PDIP-28, SSOP-28, SW-28
LTC1609	16	1	200	0V–5V, 0V–10V, 0V–4V, ±10V, ±5V, ±3.3V	5V	65	1	2	Serial	SSOP-28, SW-28
LTC1858	14	8	100	Software-Programmable 0V–5V, 0V–10V, ±5V, or ±10V	5V	40	1	1.5	Serial	SSOP-28
LTC1855	14	8	100	±10V	5V	40	1	1.5	Serial	SSOP-28
LTC1857	12	8	100	Software-Programmable 0V–5V, 0V–10V, ±5V, or ±10V	5V	40	1	1	Serial	SSOP-28
LTC1854	12	8	100	±10V	5V	40	1	1	Serial	SSOP-28

High Speed ADCs

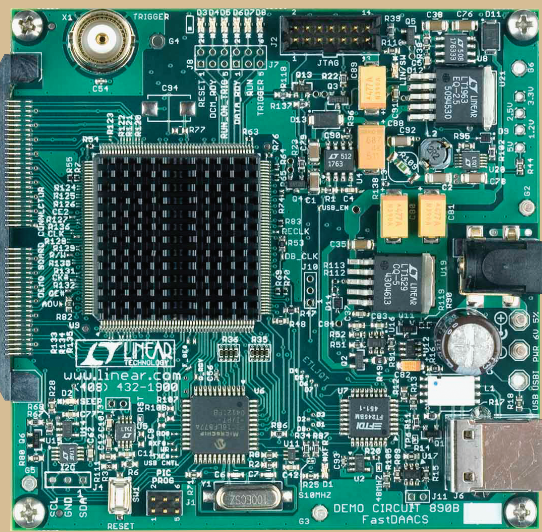
Linear's high speed ADCs offer the lowest power consumption and highest AC performance in the industry. They incorporate many unique features to ease system design and space constraints, including integrated bypass capacitance and integrated series resistance for 50Ω digital outputs. The entire high speed ADC portfolio is supported with evaluation boards and a free Quick Eval-II PScope software tool (www.linear.com/company/software.jsp).

LTC2209

- Sample Rate: 160Msps
- 77.3dBFS Noise Floor
- 100dB SFDR
- PGA Front End (2.25V_{P-P} or 1.5V_{P-P} Input Range)
- 700MHz Full Power Bandwidth S/H
- Optional Internal Dither
- Optional Data Output Randomizer
- LVDS or CMOS Outputs
- Single 3.3V Supply
- Power Dissipation: 1.45W
- 64-Pin (9mm x 9mm QFN Package)



LTC2209 Demo Board



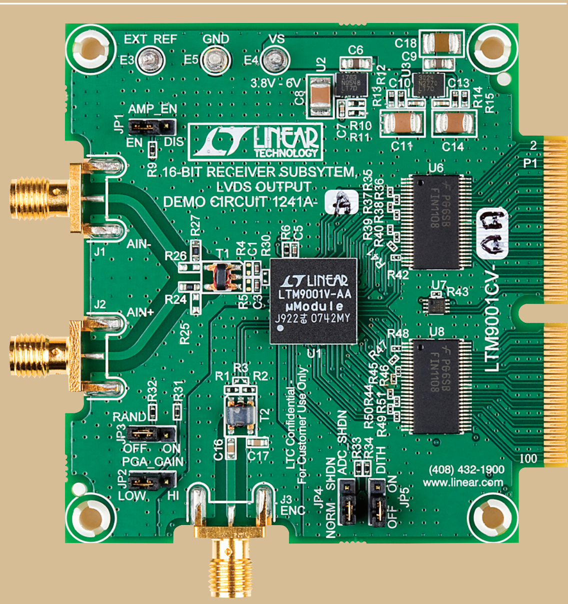
DC890B USB Interface Board

High Speed ADC Snapshot

Part No	Bits	Sample Rate	ADCs	SNR	SFDR	Full Power Bandwidth	Power Dissipation
LTC2209	16	160Msps	1	77.4dB	100dB	700MHz	1450mW
LTC2208	16	130Msps	1	77.7dB	100dB	700MHz	1250mW
LTC2207	16	105Msps	1	77.9dB	100dB	700MHz	900mW
LTC2206	16	80Msps	1	77.9dB	100dB	700MHz	725mW
LTC2205	16	65Msps	1	79.0dB	100dB	700MHz	610mW
LTC2204	16	40Msps	1	79.1dB	100dB	700MHz	480mW
LTC2203	16	25Msps	1	81.6dB	100dB	380MHz	220mW
LTC2202	16	10Msps	1	81.6dB	100dB	380MHz	140mW
LTC2285	14	125Msps	2	72.4dB	88dB	640MHz	790mW
LTC2255	14	125Msps	1	72.4dB	88dB	640MHz	395mW
LTC2242-12	12	250Msps	1	65.4dB	78dB	1.2GHz	740mW

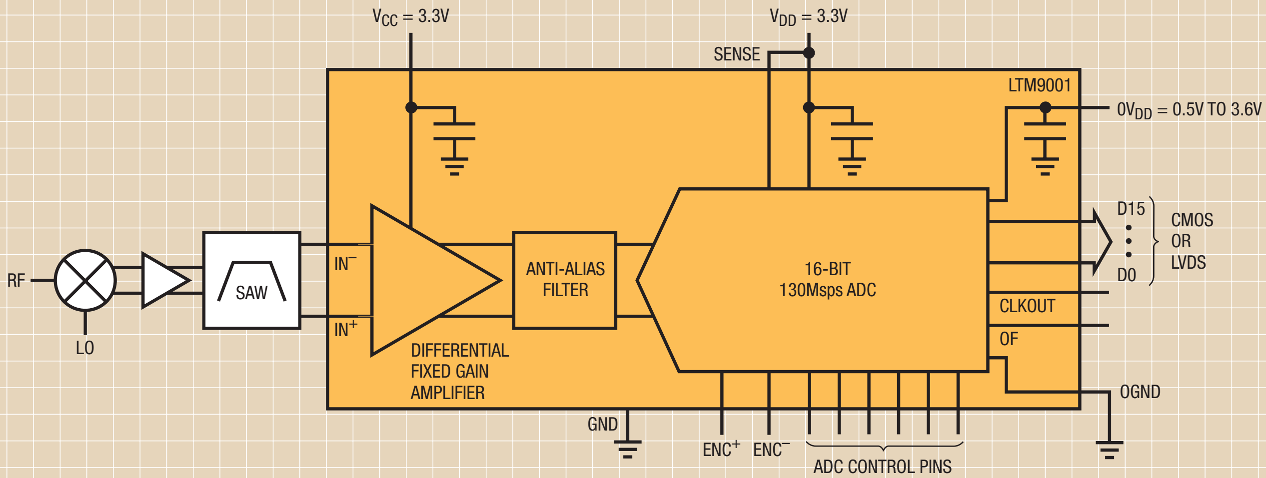
Signal Chain Module

The LTM®9001 signal chain module integrates a high speed ADC, a fixed-gain ADC driver amplifier, the bypass capacitance and the anti-alias filter components. This System in Package (SiP) module is 11.25mm x 11.25mm, which is about half of the board space for the equivalent circuit if done discretely. Demo boards are available today. Contact your local LTC sales engineer.



LTM9001-AA Demo Board

The LTM9001 Signal Chain Module Incorporates an ADC, Amplifier and Filtering



Ultra-Tiny 12-/10-/8-Bit DACs with Internal Reference

Linear Technology's DACs work well in a wide variety of open-loop or closed-loop systems, adjusting gain, offset and many other signals. From 8-bit singles to 16-bit octals, serial or parallel I/O, Linear has a DAC to suit your application.

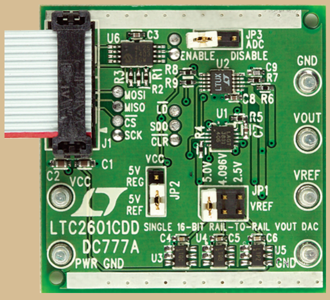
LTC2630/LTC2631/LTC2640

- Integrated Precision Reference:
  2.5V Full Scale 10ppm/°C (LTC2630-L)
  4.096V Full Scale 10ppm/°C (LTC2630-H)
- Maximum 12-Bit INL Error: 1LSB
- Guaranteed Monotonic Over Temperature
- Selectable Internal Reference or Supply as Reference (LTC2630)
- Bidirectional Reference: External Input or 10ppm/°C Output (LTC2631/LTC2640)
- SPI Serial Interface (LTC2630/LTC2640)
- I²C Serial Interface (LTC2631)
- 2.7V to 5.5V Supply Range (LTC2630-L)
- Low Power Operation: 180µA at 3V, 1.8µA (Max) Shutdown Mode
- Guaranteed Operation to 125°C
- Power-On Reset to Zero or Midscale Options
- Tiny 6-Lead SC70 Package (LTC2630)
- Tiny 8-Lead TSOT-23 Packages (LTC2631, LTC2640)

	Single DACs w/ Internal Reference	Single DACs w/ Reference Input/Output		Maximum Ambient Temperature
Resolution	SPI	I²C	SPI	
12-Bit	LTC2630-12	LTC2631-12	LTC2640-12	125°C
10-Bit	LTC2630-10	LTC2631-10	LTC2640-10	125°C
8-Bit	LTC2630-8	LTC2631-8	LTC2640-8	125°C

Compact, Micropower DACs for Control Loop Applications

- Smallest Pin-Compatible DAC Family: Single, Dual, Quad and Octal
  LTC2600: 16 Bits
  LTC2610: 14 Bits
  LTC2620: 12 Bits
- Guaranteed 16-Bit Monotonic Over Temperature
- Wide 2.5V to 5.5V Supply Range
- Low Power Operation
- Individual Channel Power-Down to 1µA, Max
- Ultralow Crosstalk Between DACs (<10µV)
- High Rail-to-Rail Output Drive (±15mA, Min)
- Double-Buffered Digital Inputs



LTC2601 Demo Board, Single 16-Bit DAC in 3mm x 3mm Package. Demo Board works with QuickEval System.

Compact, Micropower DACs for Control Loop Applications

Part No	Bits	DAC Outputs	I/O	Packages	Power (mW)	V_{CC}
LTC2600/ LTC2610/ LTC2620	16/14/12	8	SPI	SSOP-16	20	2.5V–5.5V
LTC2604/ LTC2614/ LTC2624	16/14/12	4	SPI	SSOP-16	10	2.5V–5.5V
LTC2602/ LTC2612/ LTC2622	16/14/12	2	SPI	MSOP-8	6.5	2.5V–5.5V
LTC2601/ LTC2611/ LTC2621	16/14/12	1	SPI	DFN-10	1.875	2.5V–5.5V
LTC2605/ LTC2615/ LTC2625	16/14/12	8	I²C	SSOP-16	20	2.7V–5.5V
LTC2609/ LTC2619/ LTC2929	16	4	I²C	SSOP-16	10	2.7V–5.5V
LTC2607/ LTC2617/ LTC2627	16	2	I²C	MSOP-8	6.5	2.7V–5.5V
LTC2606/ LTC2616/ LTC2626	16	1	I²C	DFN-10	1.875	2.7V–5.5V
LTC1660/ LTC1665	10/8	8	SPI	SSOP-16	1	2.7V–5.5V
LTC1664	10	4	SPI	SSOP-16	1	2.7V–5.5V
LTC1662	10	2	SPI	MSOP-8	0.017	2.7V–5.5V
LTC1669	10	1	I²C	TSOT23-5, MSOP-8	0.375	2.7V–5.5V

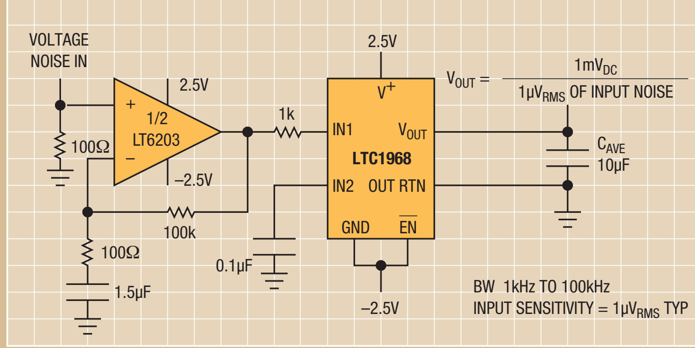
RMS-to-DC Converters

Linear Technology's simple, true RMS-to-DC converters use an innovative delta-sigma computational technique that features high linearity and accuracy suitable for a wide variety of AC measurement applications.

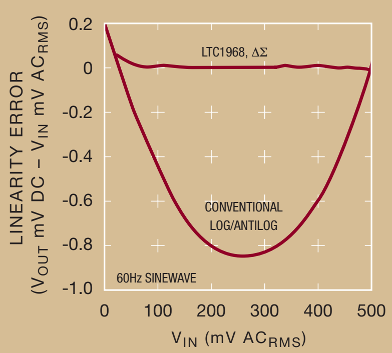
LTC1968

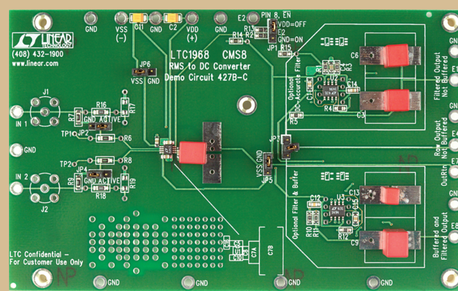
- High Linearity: 0.02% Linearity Allows Simple System Calibration
- Wide Input Bandwidth: Bandwidth to 0.1% Additional Gain Error: 40kHz
- No-Hassle Simplicity: True RMS-to-DC Conversion with Only One External Capacitor
- Low Supply Current: 330µA
- Flexible Inputs: Differential or Single Ended
- Flexible Output: Rail-to-Rail Output
- Small Size: Space-Saving 8-Pin MSOP Package

RMS Noise Measurement



Linearity Performance





LTC1968 Demo Board

RMS-to-DC Converters

Part No	1% Error Bandwidth (Typ) kHz	3dB Error Bandwidth (Typ) kHz	Max Linearity Error (%)	Max Conversion Gain Error (%)	V_S Max (V)	I_{SUPPLY} Max 25°C (mA)	Package
LTC1966	6	800	0.15	0.3	12	0.17	MSOP-8
LTC1967	200	4000	0.15	0.3	6	0.39	MSOP-8
LTC1968	500	15000	0.15	0.3	6	2.3	MSOP-8

Precision References

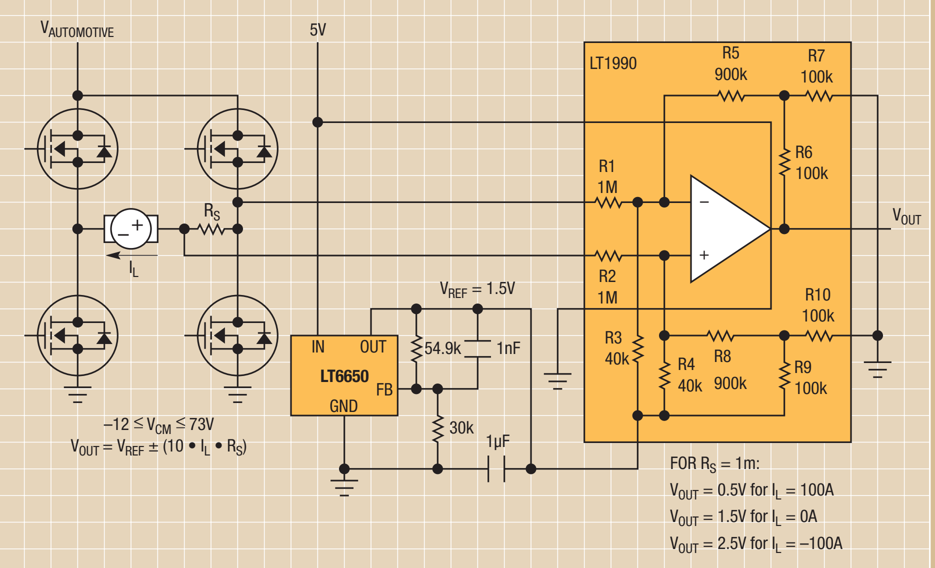
Linear Technology offers a broad line of series and shunt precision voltage references, where some are designed to operate in either shunt or series mode. Linear's references offer excellent initial accuracy and low drift over time and temperature.

LT6650

The LT6650 combines a 400mV reference and a buffer to provide a programmable output voltage.

- Low Quiescent Current: 5.6µA (Typ)
- Wide Supply Range: 1.4V to 18V
- 400mV Reference ±1% Maximum Accuracy Over Temperature at 5V
- Rail-to-Rail Buffer Amplifier
- 0.5% 400mV Maximum Initial Accuracy at 5V
- Shunt Configurable
- Sinks and Sources Current
- Wide Operational Range –40°C to 125°C
- Externally Adjustable Output Voltage
- Low Profile 1mm 5-Lead SOT-23 (ThinSOT™) Package

Full-Bridge Load Current Monitor



Selected Precision References

Part No	Series/ Shunt	Reference Values (V)	Accuracy (%)	Max Drift (ppm/°C)	Package	I_{SUPPLY}*	Min In/Out Voltage (V)	Line RegMax (ppm/V)	Comment
LT1790	Series	1.25, 2.048, 2.5, 33.3, 4.049, 5	0.05	10	SOT-23-6	60µA	0.1	170	High Precision SOT-23 Reference
LT1461	Series	2.5, 3, 4, 5	0.04	3	SO-8	50µA	0.3	6	Precision LDO with Shutdown
LT1460	Series	2.5, 3, 3.3, 5, 10	0.075	10	SO-8, MS-8, DIP-8, TO-12	130µA	0.9	25	Output Capacitor Optional
LT1236	Both	5, 10	0.05	5	SO-8, DIP	1.2mA	2.2	6	Tight Tolerance and Low TC
LT1634	Shunt	1.25, 2.5, 4.096, 5	0.05	10	MS-8, SO-8	7µA	N/A	N/A	Micropower, Precision Shunt
LT1019	Both	2.5, 4, 5, 10	0.05	5	DIP-8, TO-5, SO-8	1mA	1.1	3	High Line Rejection
LT6650	Series	-18–18	0.5	30 typ	SOT-23	11µA	0.1	900	400mV Ref with Rail-to-Rail Amplifier
LT6660	Series	2.5, 3, 3.3, 5, 10	0.2	20	DFN	180µA	0.9	800	Micropower Precision Series
LTC6652	Series	1.25, 2.048, 2.5, 3, 3.3, 4.096, 5	0.05	5	MS-8	560µA	0.3	50	Precision, Low Drift, Low Noise

*Min Operating Current for Series Operation or Max Quiescent for Shunt Operation

Silicon Oscillators

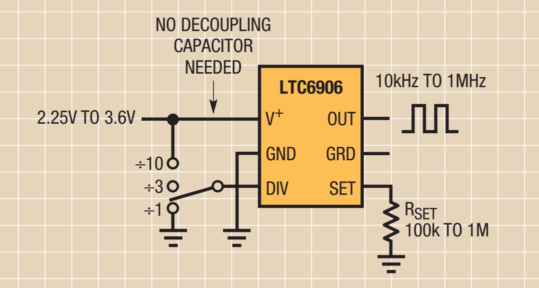
Linear Technology's silicon oscillators generate precisely controlled square wave clock signals. These low power solid-state devices are resistant to shock and vibration, have fast start-up characteristics and offer a wide range of output frequencies that are set by a single resistor, by strapping pins, or through a digital serial interface. They are useful for general system timing as well as for synchronizing switching regulators.

LTC6906

- Micropower: 65µA Max at 1MHz
- Resistor Programmable: 10kHz to 1MHz
- 1% accuracy @ 25°C
  (1.5% over 0°C to 70°C)
- Supply Voltage and Current:
  2V to 5.5V, IS = 25µA at 100kHz
- No Decoupling Capacitor Needed
- Start-Up Time Under 100µ at 1MHz
  First Cycle After Power-Up is Accurate
- CMOS Output Driver
- Low Profile (1mm) SOT-23 Package

LTC6906
Demo Board

Micropower Clock Generator



Silicon Oscillators

Part No	Program Method	Frequency Range	Frequency Accuracy Max 25°C	Frequency Drift	I_S Max $V_S = V_{MIN}$ (µA)	Package	Comments
LTC1799	Resistor	1kHz–30MHz	1.50%	40ppm/°C	1.1@3MHz	SOT-23	General Purpose
LTC6900	Resistor	1kHz–20MHz	1.50%	40ppm/°C	0.86@10MHz	SOT-23	Low Power
LTC6902	Resistor	5kHz–20MHz	1.50%	40ppm/°C	1.8@10MHz	MS-10	4 Outputs, Spread Spectrum
LTC6903	Serial–SPI	1kHz–68MHz	1.10%	10ppm/°C	3.1@5MHz	MS-8	SPI Interface
LTC6904	Serial–I²C	1kHz–68MHz	1.10%	10ppm/°C	3.1@5MHz	MS-8	I²C Interface
LTC6905	Resistor	17MHz–170MHz	1.40%	20ppm/°C	5@21MHz	SOT-23	High Frequency
LTC6905-xxx	Fixed	20MHz–133MHz	1.00%	20ppm/°C	15@133MHz	SOT-23	No Freq Set Resistor Required
LTC6906	Resistor	10KHz – 1MHz	0.50%	50ppm/°C	.015@100kHz	SOT-23	Micropower
LTC6907	Resistor	40KHz–4MHz	0.50%	50ppm/°C	.036@400kHz	SOT-23	Micropower
LTC6908-x	Resistor	50kHz–10MHz	1.50%	40ppm/°C	1.6@5MHz	SOT-23, DFN-6	2 Outputs, Spread Spectrum
LTC6930-x	Pin-Set	32.678kHz–8.192MHz	0.09%	1ppm/°C	0.43@5MHz	DFN-8, MS-8	8 Pin-Selectable Frequencies per Device

Sales Offices

NORTH AMERICA

NORTHERN CALIFORNIA / NEVADA

Bay Area
720 Sycamore Dr.
Milpitas, CA 95035
Tel: (408) 428-2050
Fax: (408) 432-6331

Sacramento / Nevada
2260 Douglas Blvd., Ste. 280
Roseville, CA 95661
Tel: (916) 787-5210
Fax: (916) 787-0110

PACIFIC NORTHWEST

Denver
7007 Winchester Cir., Ste. 130
Boulder, CO 80301
Tel: (303) 926-0002
Fax: (303) 530-1477

Portland
5005 SW Meadows Rd., Ste. 410
Lake Oswego, OR 97035
Tel: (503) 520-9930
Fax: (503) 520-9929

Salt Lake City
Tel: (801) 731-8008

Seattle
2018 156th Ave. NE, Ste. 100
Bellevue, WA 98007
Tel: (425) 748-5010
Fax: (425) 748-5009

SOUTHWEST AREA

Los Angeles
21243 Ventura Blvd., Ste. 238
Woodland Hills, CA 91364
Tel: (818) 703-0835
Fax: (818) 703-0517

Orange County
15375 Barranca Pkwy., Ste. A-213
Irvine, CA 92618
Tel: (949) 453-4650
Fax: (949) 453-4765

Phoenix
2085 E. Technology Cir., Ste. 101
Tempe, AZ 85284
Tel: (480) 777-1600
Fax: (480) 838-1104

San Diego
5090 Shoreham Place, Ste. 110
San Diego, CA 92122
Tel: (858) 638-7131
Fax: (858) 638-7231

CENTRAL AREA

Chicago
2040 E. Algonquin Rd., Ste. 512
Schaumburg, IL 60173
Tel: (847) 925-0860
Fax: (847) 925-0878

Cleveland
7550 Lucerne Dr., Ste. 106
Middleburg Heights, OH 44130
Tel: (440) 239-0817
Fax: (440) 239-1466

Columbus
Tel: (614) 488-4466

Detroit
39111 West Six Mile Road
Livonia, MI 48152
Tel: (734) 779-1657
Fax: (734) 779-1658

Indiana
Tel: (317) 581-9055

Iowa
Tel: (319) 393-5763

Kansas
Tel: (913) 829-8844

Minneapolis
7805 Telegraph Rd., Ste. 225
Bloomington, MN 55438
Tel: (952) 903-0605
Fax: (952) 903-0640

Wisconsin
Tel: (262) 859-1900

NORTHEAST AREA

Boston
15 Research Place
North Chelmsford, MA 01863
Tel: (978) 656-4750
Fax: (978) 656-4760

Connecticut
Tel: (860) 228-4104

Philadelphia
3220 Tillman Dr., Ste. 120
Bensalem, PA 19020
Tel: (215) 638-9667
Fax: (215) 638-9764

SOUTHEAST AREA

Atlanta
Tel: (770) 888-8137

Austin
8500 N. Mopac, Ste. 603
Austin, TX 78759
Tel: (512) 795-8000
Fax: (512) 795-0491

Dallas
17000 Dallas Pkwy., Ste. 200
Dallas, TX 75248
Tel: (972) 733-3071
Fax: (972) 380-5138

Fort Lauderdale
Tel: (954) 473-1212

Houston
1080 W. Sam Houston Pkwy., Ste. 225
Houston, TX 77043
Tel: (713) 463-5001
Fax: (713) 463-5009

Huntsville
Tel: (256) 881-9850

Orlando
Tel: (407) 688-7616

Raleigh
15100 Weston Pkwy., Ste. 202
Cary, NC 27513
Tel: (919) 677-0066
Fax: (919) 678-0041

Tampa
Tel: (813) 634-9434

CANADA

Calgary, AB
Tel: (403) 455-3577

Montreal, QC
Tel: (450) 689-2660

Ottawa, ON
Tel: (613) 421-3090

Toronto, ON
Tel: (440) 239-0817

Vancouver, BC
Tel: (604) 729-1204

ASIA

AUSTRALIA / NEW ZEALAND

Linear Technology Corporation
133 Alexander Street
Crows Nest NSW 2065
Australia
Tel: +61 (0)2 9432 7803
Fax: +61 (0)2 9439 2738

CHINA

Linear Technology Corp. Ltd.
Units 1503-04, Metroplaza Tower 2
223 Hing Fong Road
Kwai Fong, N.T., Hong Kong
Tel: +852 2428-0303
Fax: +852 2348-0885

Linear Technology Corp. Ltd.
Room 2701, City Gateway
No. 398 Cao Xi North Road
Shanghai, 200030, PRC
Tel: +86 (21) 6375-9478
Fax: +86 (21) 5465-5918

Linear Technology Corp. Ltd.
Room 816, 8/F
China Electronics Plaza B
No. 3 Dan Ling Rd., Hai Dian District
Beijing, 100080, PRC
Tel: +86 (10) 6801-1080
Fax: +86 (10) 6805-4030

Linear Technology Corp. Ltd.
Room 2604, 26/F
Excellence Times Square Building
4068 YiTian Road, Futian District
Shenzhen, 518048, PRC
Tel: +86 755-8236-6088
Fax: +86 755-8236-6008

JAPAN

Linear Technology KK
8F Shuwa Kioicho Park Bldg.
3-6 Kioicho Chiyoda-ku
Tokyo, 102-0094, Japan
Tel: +81 (3) 5226-7291
Fax: +81 (3) 5226-0268

Linear Technology KK
6F Kearny Place Honmachi Bldg.
1-6-13 Awaza, Nishi-ku
Osaka-shi, 550-0011, Japan
Tel: +81 (6) 6533-5880
Fax: +81 (6) 6543-2588

Linear Technology KK
7F, Sakuradori Ohtsu KT Bldg.
3-20-22 Marunouchi, Naka-ku Nagoya-shi,
460-0002, Japan
Tel: +81 (52) 955-0056
Fax: +81 (52) 955-0058

KOREA

Linear Technology Korea Co., Ltd.
Yundang Building, #1002
Samsung-Dong 144-23
Kangnam-Ku, Seoul
135-090 Korea
Tel: +82 (2) 792-1617
Fax: +82 (2) 792-1619

SINGAPORE

Linear Technology Pte. Ltd.
507 Yishun Industrial Park A
Singapore 768734
Tel: +65 6753-2692
Fax: +65 6752-0108

TAIWAN

Linear Technology Corporation
8F-1, 77, Nanking E. Rd., Sec. 3
Taipei, Taiwan
Tel: +886 (2) 2505-2622
Fax: +886 (2) 2516-0702

EUROPE

FINLAND

Linear Technology AB
Teknobulevardi 3-5
P.O. Box 35
FIN-01531 Vantaa
Finland
Tel: +358 (0)9 2517 8200
Fax: +358 (0)9 2517 8201

FRANCE

Linear Technology S.A.R.L.
Parc Tertiaire Silic
2 Rue de la Couture, BP10217
94518 Rungis Cedex
France
Tel: +33 (1) 56 70 19 90
Fax: +33 (1) 56 70 19 94

GERMANY

Linear Technology GmbH
Osterfeldstrasse 84, Haus C
D-85737 Ismaning
Germany
Tel: +49 (89) 962455-0
Fax: +49 (89) 963147

Linear Technology GmbH
Haselburger Damm 4
D-59387 Ascheberg
Germany
Tel: +49 (2593) 9516-0
Fax: +49 (2593) 951679

Linear Technology GmbH
Jesinger Strasse 65
D-73230 Kirchheim/Teck
Germany
Tel: +49 (0)7021 80770
Fax: +49 (0)7021 807720

ITALY

Linear Technology Italy Srl
Orione 3, C.D. Colleoni
Via Colleoni, 17
I-20041 Agrate Brianza (MI)
Italy
Tel: +39 039 596 5080
Fax: +39 039 596 5090

SWEDEN

Linear Technology AB
Electrum 204
Isafjordsgatan 22
SE-164 40 Kista
Sweden
Tel: +46 (8) 623 16 00
Fax: +46 (8) 623 16 50

UNITED KINGDOM

Linear Technology (UK) Ltd.
3 The Listons, Liston Road
Marlow, Buckinghamshire SL7 1FD
United Kingdom
Tel: +44 (1628) 477066
Fax: +44 (1628) 478153

LINEAR TECHNOLOGY

Linear Technology Corporation
1630 McCarthy Blvd.
Milpitas, CA 95035-7417
Tel: 1-800-4-LINEAR
408-432-1900
Fax: 408-434-6441
www.linear.com

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